

WHAT IS CLAIMED IS:

1. A beverage dispenser, comprising:
 - a) a housing;
 - b) an ice bin within the housing;
 - c) space within the housing configured to receive at least one container of beverage syrup;
 - d) at least one heat exchanger within the housing in thermal contact with said ice bin;
 - e) a carbonator within the housing for making carbonated water; and
 - f) at least one mixing and dispensing valve for mixing and dispensing carbonated water and syrup, wherein the dispenser is configured to receive ice, syrup, water and carbon dioxide and chill the water and syrup by exchanging heat with melting ice, and the mixing valve mixes the syrup and carbonated water and dispenses a soft drink.
2. The dispenser of claim 1 wherein the at least one heat exchanger comprises two heat exchangers: a first heat exchanger in thermal contact with ice in the ice bin, said first heat exchanger exchanging heat with circulating water; and a second heat exchanger exchanging heat between the circulating water and the syrup.
3. The dispenser of claim 2 wherein the circulating water is carbonated water.
4. The dispenser of claim 1 further comprising a circulating pump for circulating water through said at least one heat exchanger.
5. The dispenser of claim 4 wherein the pump circulates carbonated water.
6. The dispenser of claim 1 further comprising a charging pump for charging water to the carbonator.

7. The dispenser of claim 1 further comprising at least one container of syrup within the housing.
8. The dispenser of claim 7 wherein the container of syrup is a bag-in-box (BIB) container.
9. The dispenser of claim 7 wherein the syrup in the container is subject only to atmospheric pressure and is drawn out of the container by reduced pressure downstream of the container.
10. The dispenser of claim 2 further comprising a block valve between said second heat exchanger and the at least one mixing valve.
11. The dispenser of claim 2 further comprising a plastic cover covering said second heat exchanger.
12. The dispenser of claim 2 wherein the second heat exchanger comprises an aluminum body containing separate flow passages for non-carbonated water, syrup, and carbonated water.
13. The dispenser of claim 12 wherein the passages comprise tubing around which aluminum is cast.
14. The dispenser of claim 2 wherein the second heat exchanger is in the shape of an inverted U.
15. The dispenser of claim 1 wherein the at least one heat exchanger comprises an aluminum cold plate containing separate flow passages for non-carbonated water and carbonated water.
16. The dispenser of claim 1 wherein the at least one heat exchanger is in the general shape of a flat plate.
17. The dispenser of claim 1 wherein the at least one heat exchanger is located so that ice in the ice bin sits on top of, and melts to cool, the at least one heat exchanger.

18. The dispenser of claim 2 further comprising at least one container of syrup in the housing and further comprising a pump for each container of syrup in the housing, and interconnecting lines between the pump and the second heat exchanger, and wherein activating a mixing and dispensing valve causes pumping of syrup into the valve and dispensing a soft drink mixed from said syrup.

19. The dispenser of claim 1 further comprising at least one mixing and dispensing valve connected to a source of non-carbonated water and dispensing a non-carbonated beverage.

20. The dispenser of claim 1 wherein the at least one mixing and dispensing valve comprise a volumetric ratio valve which draws syrup from a source of the syrup to the mixing valve.

21. The dispenser of claim 1 further comprising a carbon dioxide tank within the housing, said tank supplying carbon dioxide to the carbonator.

22. The dispenser of claim 1 further comprising a selection manifold between the at least one mixing and dispensing valve, and a source of water and a source of carbonated water.

23. A beverage dispenser, comprising:
- a) a housing;
 - b) a carbonation system comprising a carbonator within the housing and a source of carbon dioxide;
 - c) a water system comprising a source of water, a charging pump for charging water to the carbonator, and a circulation pump for circulating water;
 - d) a source of syrup located in a space within the housing that is configured to receive at least one container of syrup;
 - e) a cooling system comprising an ice bin, a first heat exchanger for exchanging heat between ice in the ice bin and water and circulating carbonated water produced by the carbonation system, and a second heat exchanger for exchanging heat between said syrup and said circulating carbonated water; and
 - f) a dispensing system comprising at least two mixing and dispensing valves and interconnecting lines between said valves, the source of water and the source of syrup; at least one of said two mixing and dispensing valves receiving syrup and carbonated water.
24. A method of producing and dispensing a beverage, the method comprising:
- a) cooling water with a first heat exchanger in thermal contact with ice and circulating said cooled water through a second heat exchanger;
 - b) cooling syrup in said second heat exchanger;
 - c) mixing said cooled syrup and water to form a beverage; and
 - d) dispensing said beverage.
25. The method of claim 24 wherein the water circulating to the second heat exchanger is carbonated.
26. The method of claim 24 wherein a casual drink is dispensed at a temperature of 36°F or lower.
27. The method of claim 24 wherein the water used to mix the beverage is carbonated.

28. The method of claim 24 wherein the water used to mix the beverage is supplied from water cooled in the first heat exchanger.

29. The method of claim 24 wherein carbonated water is cooled and circulated and non-carbonated water is also cooled in the first heat exchanger and used to mix a second beverage.

30. A beverage dispenser, comprising:

a) a tower heat exchanger comprising at least one coil of syrup tubing and at least one coil of cooling fluid tubing embedded within a metallic body, each coil having two ends protruding from the metallic body, the cooling fluid coil ends being connected to a source of circulating cooling fluid, and a first of said ends of the syrup tubing each being connected to a source of syrup; and

b) at least one mixing and dispensing valve connected to the tower heat exchanger, wherein a second of said ends of the syrup tubing are each connected to one of said mixing and dispensing valves.

31. The beverage dispenser of claim 30 further comprising a block valve between said tower heat exchanger and the mixing and dispensing valve.

32. The beverage dispenser of claim 30 further comprising a primary heat exchanger in thermal contact with ice for cooling the circulating cooling fluid.

33. The beverage dispenser of claim 30 wherein the primary heat exchanger is chilled by a heat sink selected from the group consisting of mechanical refrigeration and ice.

34. The beverage dispenser of claim 30 wherein the primary heat exchanger is a flat plate heat exchanger under a bin of ice contained in a housing on which the tower heat exchanger is mounted.

35. The beverage dispenser of claim 30 wherein the source of circulating cooling fluid is selected from the group consisting of carbonated water and non-carbonated water.

36. The beverage dispenser of claim 30 wherein the distance between the point where the at least one syrup coil protrudes from the metallic cold plate and the at least one mixing and dispensing valve is less than 2 inches.

37. The beverage dispenser of claim 30 wherein carbonated water is used as the source of circulating cooling fluid and a portion of the circulating carbonated water is used as a source of the water combined with syrup in the at least one mixing and dispensing valve.

38. The beverage dispenser of claim 37 comprising at least two mixing and dispensing valves and wherein non-carbonated water is supplied to one of the mixing and dispensing valves from a water line also embedded in the metallic body.

39. The beverage dispenser of claim 30 wherein the at least one coil of syrup tubing is wound with multiple loops and the cooling fluid coil passes through the syrup tubing loops in a direction generally perpendicular to the tubing in the syrup coil.

40. The beverage dispenser of claim 30 further comprising a dispensing valve for dispensing a second beverage that does not require mixing syrup with water.

41. The beverage dispenser of claim 30 wherein the second beverage is supplied to the dispensing valve through tubing embedded in the metallic body.

42. The beverage dispenser of claim 30 wherein the second beverage is beer.

43. The beverage dispenser of claim 38 further comprising a selection manifold allowing a user to select whether carbonated water or non-carbonated water is supplied to the at least two mixing and dispensing valves.

44. A beverage dispensing tower comprising:
- a) a generally horizontal top bar on which a plurality of mixing and dispensing valves are attached and arranged to dispense a beverage generally downwardly;
 - b) two side supports holding the top bar in a raised position so that a cup can be placed under each of the mixing and dispensing valves; and
 - c) the tower having a generally inverted "U" shape such that the area under the top bar is open.
45. The beverage dispensing tower of claim 44 wherein each of the side supports attaches to the ends of the top bar.
46. A beverage dispenser comprising:
- a) a split heat exchanger comprising a first part and a second part;
 - b) an ice bin in thermal contact with said first part;
 - c) a pump circulating a cooling fluid between said first part and said second part; and
 - d) a source of beverage syrup connected to said second part, wherein the first part transfers heat from circulating cooling fluid to ice in the ice bin and the second part transfers heat from a beverage syrup to the circulating cooling fluid.
47. The beverage dispenser of claim 46 wherein the second part is a metallic cold plate in the form of an inverted U.
48. The beverage dispenser of claim 46 further comprising at least two product coils in said second part, and wherein the cooling fluid is selected from the group consisting of non-carbonated water and carbonated water, and the product coils in the second part convey fluid selected from the group consisting of syrup, water and beer.
49. The beverage dispenser of claim 46 wherein the cooling fluid comprises carbonated water, and wherein the dispenser further comprises a mixing and dispensing valve for mixing and dispensing a beverage made from syrup and carbonated water supplied from the circulating cooling fluid.

50. The beverage dispenser of claim 46 further comprising a dispensing valve for dispensing a beverage that does not require mixing syrup with water.

51. The beverage dispenser of claim 48 wherein the circulating cooling fluid flows in cooling coils and wherein the cooling coils and the product coils comprise tubing selected from the group consisting of embedded coils, coils embedded into the heat exchanger, and fittings for said coils.

52. The beverage dispense of claim 51 wherein the syrup is drawn from a bag-in-box (BIB) container.

53. The dispenser of claim 49 further comprising a selection manifold between the at least one mixing and dispensing valve, and sources of non-carbonated water and carbonated water.

54. A beverage dispenser comprising:

a) a heat exchanger comprising at least one tubing coil carrying syrup and at least one tubing coil carrying cooling fluid embedded within a metallic body, each coil having two ends protruding from the metallic body, the cooling fluid coil ends being connected to a source of circulating cooling fluid, a first of said ends of the syrup tubing being connected to a source of syrup; and

b) at least one mixing and dispensing valve connected to the heat exchanger, the second of said ends of the syrup tubing being connected to said at least one mixing and dispensing valve, with water and the syrup being combined in the mixing and dispensing valve to produce a beverage; and

c) at least one beer tubing coil within said metallic body for cooling beer, one end of the beer coil connected to a source of beer and the other end connected to a dispensing valve connected to the heat exchanger.

55. The beverage dispenser of claim 54 wherein the source of beer is a beer delivery system.

56. The beverage dispenser of claim 54, wherein the circulating cooling fluid is water, and further comprising a connection between the tubing carrying cooling fluid and the at least one mixing and dispensing valve.

57. The beverage dispenser of claim 54, further comprising another tubing coil carrying water embedded within the metallic body, and a connection between the tubing coil carrying water and the at least one mixing and dispensing valve.